Army Power and Energy

Army Energy and Sustainability Program

Mr. Richard Kidd
Deputy Assistant Secretary of the Army
(Energy and Sustainability)

Army Energy in Perspective

- The Army manages both Installation and Operational Energy requirements.
- The Army is the largest facility energy consumer in the Federal Government – $1.25B (FY12).
- The Army spent $3.6B on liquid fuel purchase in FY12.
- Since FY03, the Army has significantly reduced its total energy consumption from 86.7 Trillion BTU to 72.6 Trillion BTU, a total reduction of 16.2%.
- The Army has reduced its total energy intensity (BTU per square foot) as compared to the 2003 baseline by 15.7 % vs. a 21% mandate.
- In FY12 the Army reduced its petroleum usage in its Non-Tactical Vehicle fleet by 20% over FY11.

Fort Hunter Liggett 2MW photovoltaic system installed

Afghanistan micro-grid project

Micro-grid demonstration at Fort Dix, NJ

The Power Is In Your Hands

"When Soldiers start thinking:

HOW CAN I USE ENERGY

CALL FOR ACTION

As we operate across the spectrum of missions, we must conserve energy and reduce risk. Energy consumption is a burden on the unit, as well as a huge funding and resource requirement. Most importantly, it leaves our operations vulnerable.

Every time we deliver fuel or batteries on the battlefield we put Soldiers at risk. As volumes increase, more storage is required, making our forward operating bases larger and harder to protect.

We are examining every way possible to be more effective with our energy use, to employ renewable resources, and lower our costs. All of this will reduce the number of convoys on the roads. But it requires us to change our behavior. When Soldiers start thinking: HOW CAN I USE ENERGY SMARTER?, we know we are on our way.

SMA RAYMOND F. CHANDLER III
SERGEANT MAJOR OF THE ARMY

GEN. RAYMOND T. ODIERNO
ARMY CHIEF OF STAFF

HON. JOHN M. MCHUGH
SECRETARY OF THE ARMY

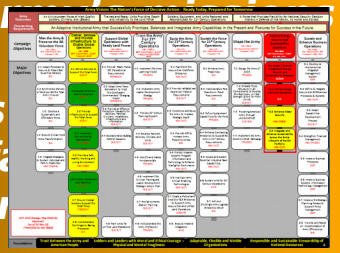
Guidance and Direction

General Order 2012-01:

"The Assistant Secretary of the Army for Installations, Energy and the Environment (ASA(IE&E)) shall provide strategic guidance and supervision for policies, plans and programs for… energy security, operational energy, water security, contingency bases and environmental initiatives…"

Senior Energy and Security Council (SESC):

- ***In 2011, "the Army established the SESC to provide strategic direction to integrate energy and sustainability into Army plans, programs, policies and regulations to meet the A and objectives…"***
- ***"The DASA(E&S) serves Executive Secretary and f conduct of all SESC meeti***



Army Campaign Plan (ACP):

In 2012, the SecArmy added Campaign Objective 8.0 – Achieve Energy Security & Sustainability

"Improving our energy security directly translates to improving our national security."

General Martin E. Dempsey

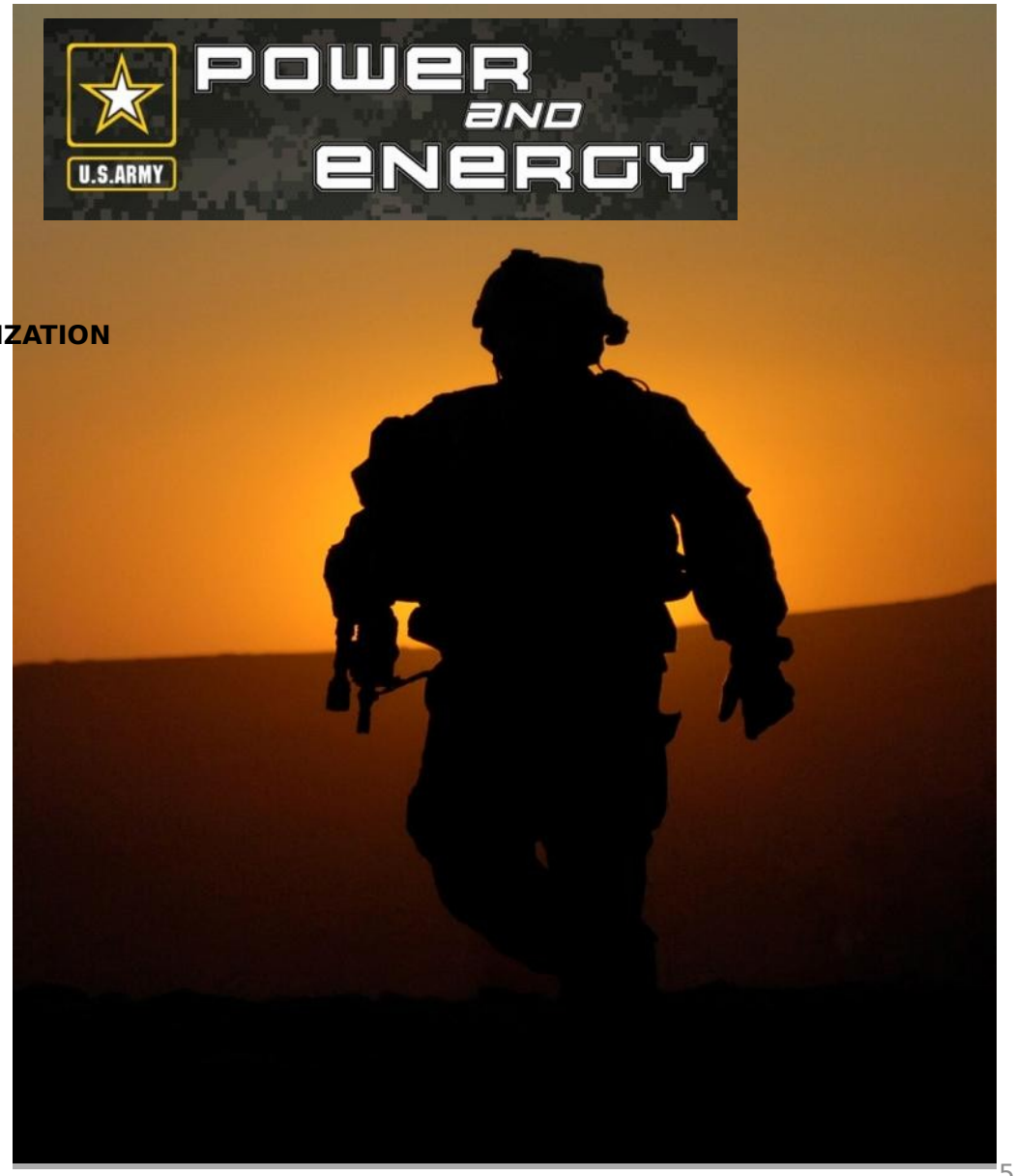
Chairman of the Joint Chiefs of Staff, 18 October 2011

- The Secretary's and Chief of Staff of the Army's (CSA) priorities demand that proper attention be given to energy security.
- The Army Chief of Staff has articulated the requirement for a versatile mix of capabilities, optimized with the reach, endurance, protection, and staying power needed to meet and exceed future security threats and

Strategic Context

Energy Security is defined as "having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet mission essential requirements."

FY 2012, NATIONAL DEFENSE AUTHORIZATION ACT



- The Army has historically undervalued energy and energy security
- Treating energy as a "free good" (unintentionally) creates vulnerabilities and risks in terms of:
  - **Cost**: Waste, commodity price escalation, and volatility
  - **Operational Constraints**: Vulnerable Lines of Communication, casualties tied to supply and resupply functions, diverted combat power

A Multi-Disciplinary Approach

Basing — Installation | Contingency

Soldier

Vehicles — Tactical | Non Tactical

Net Zero Installations
Contingency Basing
Smart & Green Energy
Mini Grid Power Plants
Adv. Mobile Medium Power Sources
Insulated Tents/Spray Foam
Renewable Energy Program Plan
ARNG Energy Lab (Schools)
LED & Electroluminescent Lighting
Shower Water Reuse System
Expeditionary Water

Rucksack Enhanced Portable Power
Expeditionary Energy
Soldier Power Manager

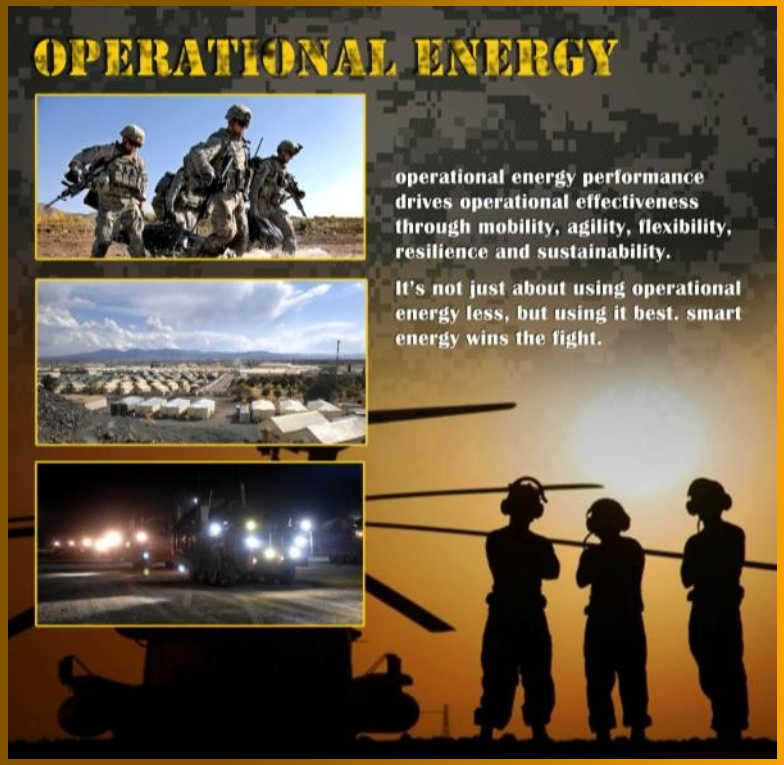
OSD Operational Energy Strategy
Senior Energy & Sustainability Council
Energy Initiatives Task Force
Army Energy Security Initiatives
Net Zero Strategy

Tactical Fuels Manager Defense
Smart-Charging Micro Grids
Vehicle-to-Grid (Fort Carson, CO)
Alternative Fuels
Low Speed Electric Vehicles
Hybrid Electric Vehicles
Hybrid Truck Users Forum (TARDEC)
Hydrogen Fuel Cell Vehicles
Improved Turbine Engine Program

Operational Energy
Installation

Enhancing Mission Effectiveness

Operational Energy


OPERATIONAL ENERGY
operational energy performance drives operational effectiveness through mobility, agility, flexibility, resilience and sustainability.
It's not just about using operational energy less, but using it best. smart energy wins the fight.

- The Army spent $3.6 Billion on fuel in FY12.
- 70-80% of resupply weight in theater consists of fuel and water.
- 40% of fuel goes to produce electricity – we have the technology and know how to save between 30-60% of this amount
- ***Reducing fuel and water demand will reduce logistical burdens, save lives, and expand capability. To achieve this the Army has:***
  - Deployed 36 mini-grids, saving 50 million gallons annually;
  - Accelerated fielding of new generator (AAMPS), 21% more efficient and designed to be networked;
  - Deployed "hybrid" energy systems with solar panels, battery storage, and power management systems;
  - Established a robust and structure test and evaluations system, integrated with training as well as doctrine development
  - Working to drive behavior change across all levels of the Army
- ***Results can be measured in terms of dollars saved and capability***
- ***Tactical Energy Security Investments are***

Advantages in Operational Edge

Enabled by Energy

GY EDGE > TECHNOLOGY EDGE > OPERATIONA

Technology: A Force Multiplier by a Factor of 20

Since WWII we have approximately
- 20 times fewer Soldiers, and
- 20 times more fuel consumption per Soldier

SOLDIERS **Decreasing Operational Scale**

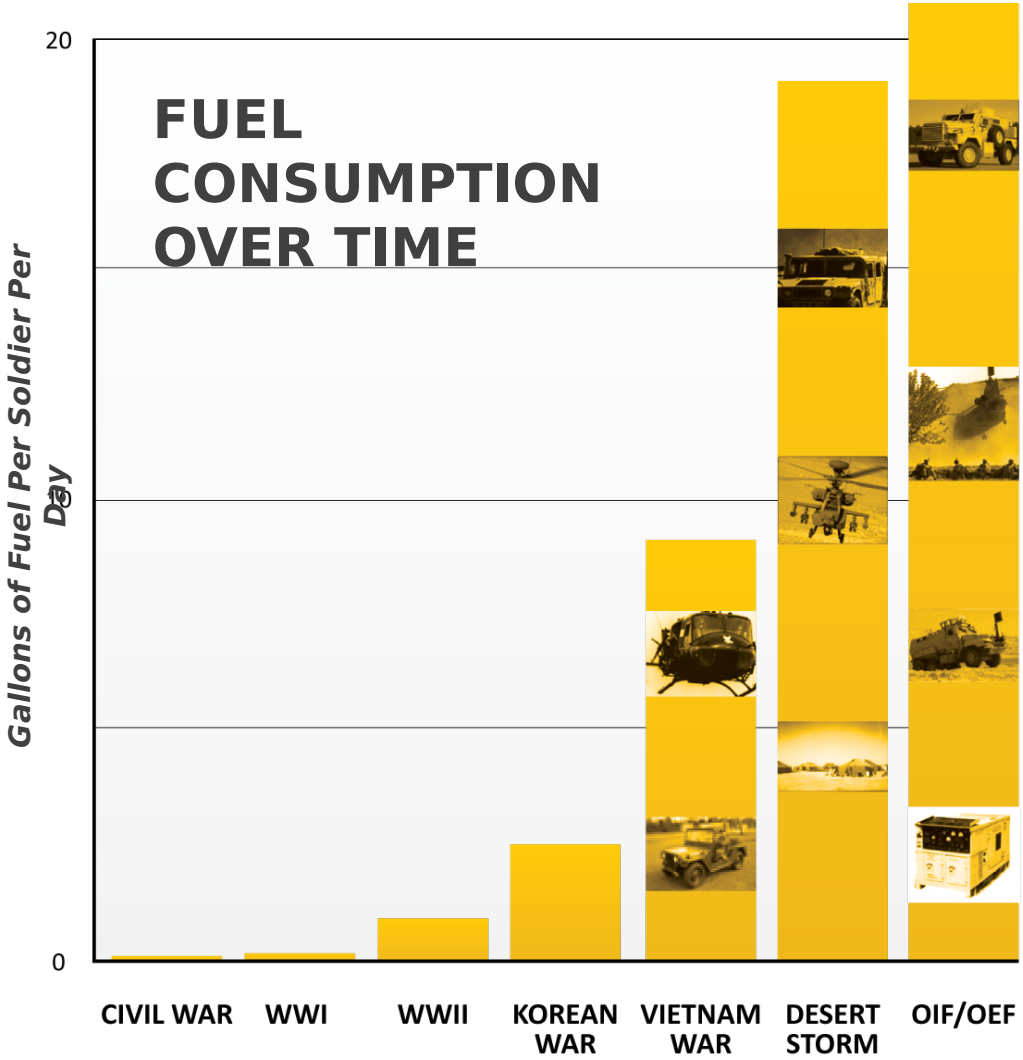
20x

Ground Forces, WW-II:
2.8 million (Mar 1945)
Ground Forces OEF/OIF):
140,000 (Mar 2011)

FUEL **Increasing Fuel Consumption**

20x

Ground Forces, WW-II:
1+ gallon per Soldier per day
Ground Forces OEF/OIF):
20+ gallons per Soldier per d



Where We Are Today

SOLDIER - Integrate smart energy initiatives to enhance Soldier's effectiveness.

- **Soldier Worn Integrated Power Enhanced System:** Reduces energy weight for three-day patrol by 30% (from 14 to 9.8 lbs for team leader)
- **Capability Set 13**: In FY-12/13, five brigades were equipped with modernized energy efficient equipment

BASING - Integration of fuel, water, and waste (F/W/W) disposal system efficiencies are being tested worldwide.

- **Base Camp Integration Laboratory at Fort Devens:** Improved F/W/W disposal efficiency
- **Smart and Green Energy:** Maximizes engineering specifications; present savings from 30% to 60%
- **Kuwait Energy Efficiency Project:** Improves shelter & microgrids, reduces consumption, expected cost return in year 1
- **Shower Water Reuse System:** Expected to reduce water consumption by 75%.

WHEELED VEHICLES - Technology to enable Soldiers to recharge batteries, reduce reliance on mobile Power generation, and extend operational reach.

- **Abrams Auxiliary Power Unit:** At tactical idle consumes 17 gallons per hour (83% efficiency gain)
- **Bradley Transmission Upgrade:** Will generate an overall fuel savings of 3%

Enhancing Mission Effectiveness

Installation Energy

BASING POWER
INSTALLATION
RECLAIMED WATER
DO NOT
DRINK OR
SWIM
We are driving efficiencies cross the enterprise; reducing our energy footprint though technology and policies; and are leveraging private financing to accelerate energy projects.

Through technology and policies we are reducing our energy footprint. We will provide flexibility and resiliency by developing alternatives and adaptable capabilities

- The Army is largest facility energy consumer in the Federal Government – $1.25B (FY12).
- Since FY03 the Army has reduced its energy intensity by 15.7% while total population on its installations has increased 20%.
- Established Net Zero Initiative to demonstrate integrated design principals that will ensure the Army of tomorrow has the same access to energy, water, land and natural resources as the Army of today.
- Formed the Energy Initiatives Task Force to develop large scale renewable energy projects that will help strengthen energy security while supporting the Army's energy goals.
- Army has most robust ESPC program in entire Federal government.
  - Secured more than $1.5B in ESPC and UESC investment at more than 72 installations.
  - Cost avoidance of $148 million.
  - Energy savings of more 7.986 trillion British Thermal Units (BTU).
  - Army efforts over the past year have reduced process times on these contracts to less than 14 months.
- The Army is actively managing its non-tactical vehicle fleet to reduce size and improve efficiency, resulted in a 28.5% fuel use reduction since FY05.

Third Party Financing

Energy Savings Performance Contracts (ESPC) / Utilities Energy Services Contracts (UESC) and Utilities Privatization (UP)

- **Private Companies / Servicing Utilities provide initial private capital investment to execute projects**
- **For ESPCs & UESCs, repayment is from realized energy savings paid from Utilities Services Program funds**
- **Army has most robust ESPC program in Federal government & improving - Will meet 2011 Presidential Goals**
- **More ESPC's and UESC's were awarded in FY program**

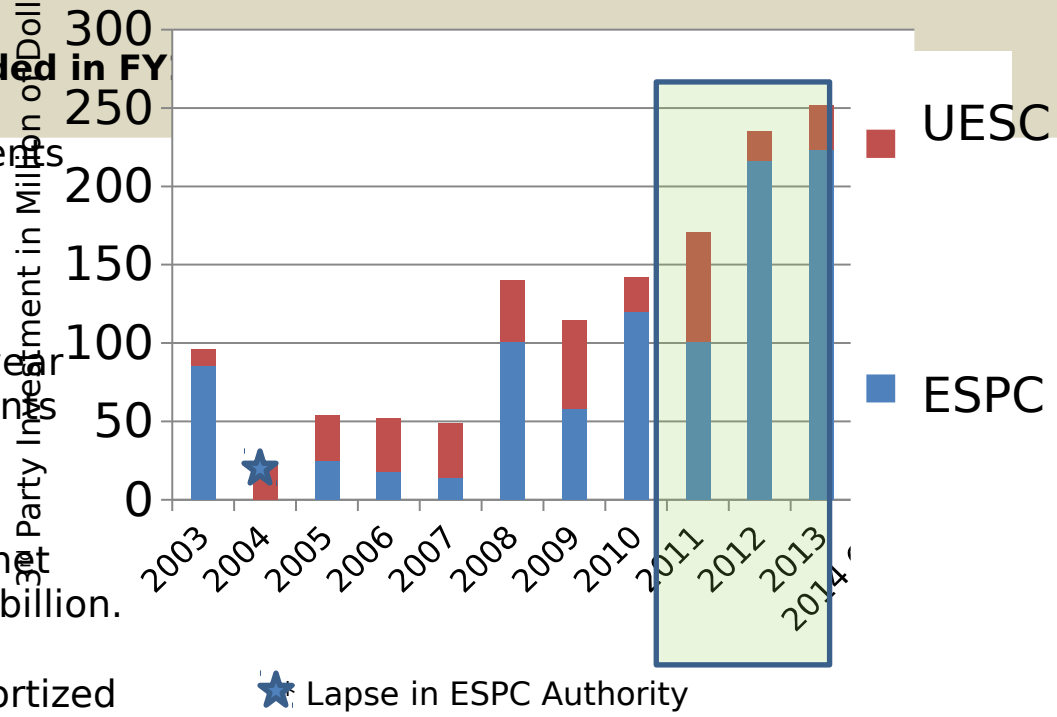
- $1.16 Billion of Private sector investments
- $400 Million more in development

UESCs:

- Over 350 task orders/ 43 installations
- > 3.8 Trillion BTU Energy Savings per year
- $543 Million in Private sector investments
- $100 Million more in development

UP:

- 149 UP awards made through FY12, a net present value cost avoidance of $2.0 billion.
- 86% of utility systems evaluated.
- All new, major UP investments are amortized



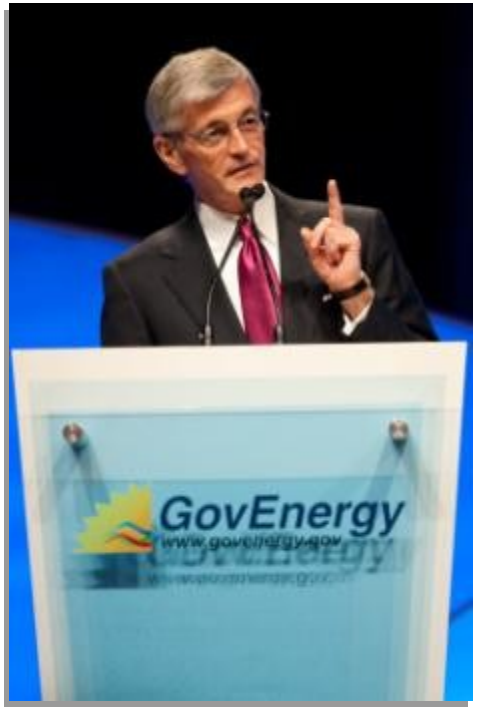
Direct correlation between installations with ESPC/UESC projects and success in meeting energy efficiency goals

Army Energy Initiatives Task Force

Established by the Secretary of the Army on September 15, 2011.

The Energy Initiatives Task Force (EITF) serves as the central management office for **partnering** with Army installations to implement **cost-effective, large-scale,** renewable energy projects, leveraging **private sector financing**.

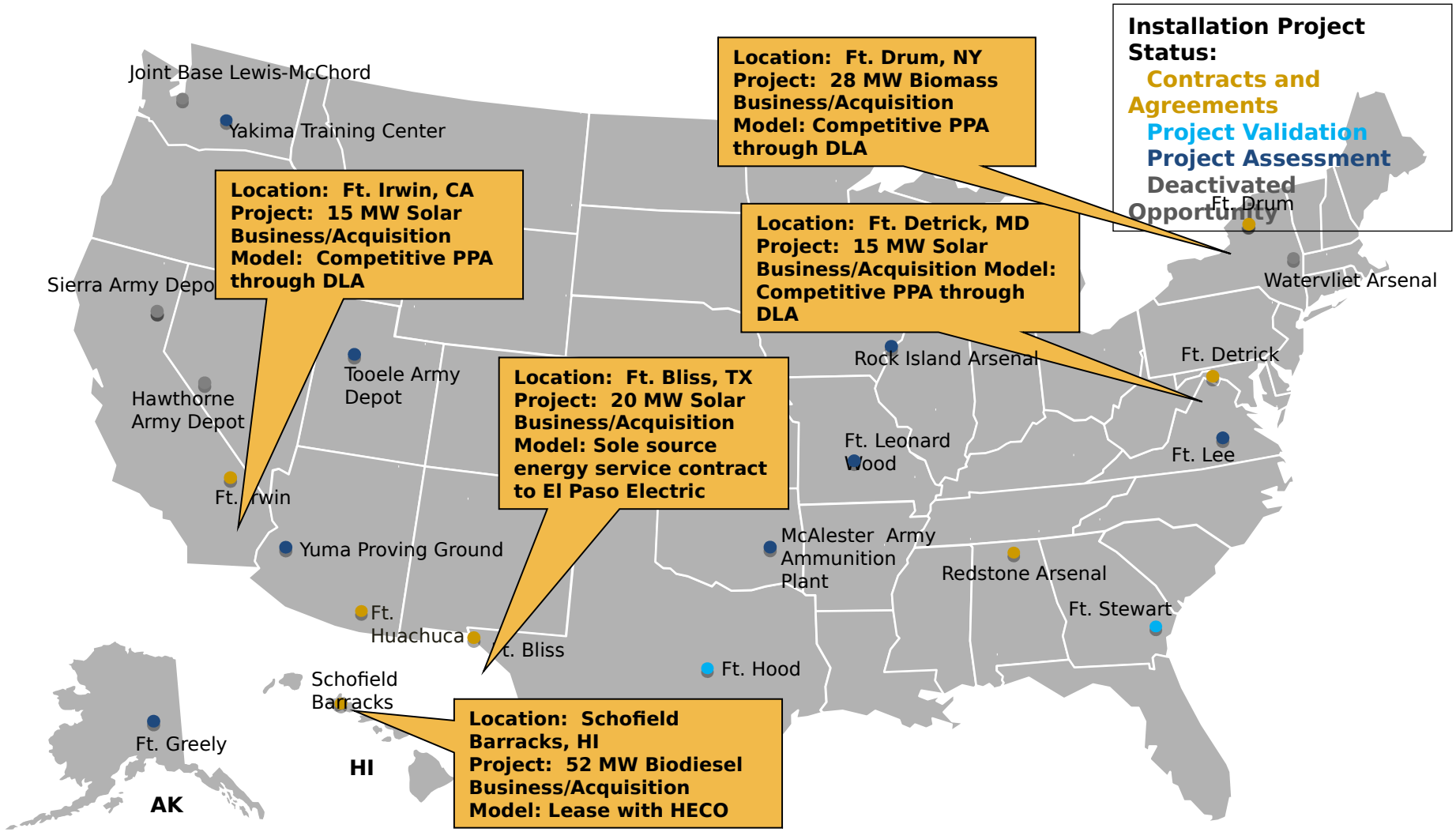
- Projects **equal to or greater than 10MW**
  - Will coordinate with installations for 1-10MW opportunities
  - Potential for projects that exceed Army requirements
- Solar, Wind, Biomass and Geothermal technologies
- Resources to perform project development and execution
- Will use existing DoD land-use and third-party financing authorities



Secretary of the Army John M. McHugh

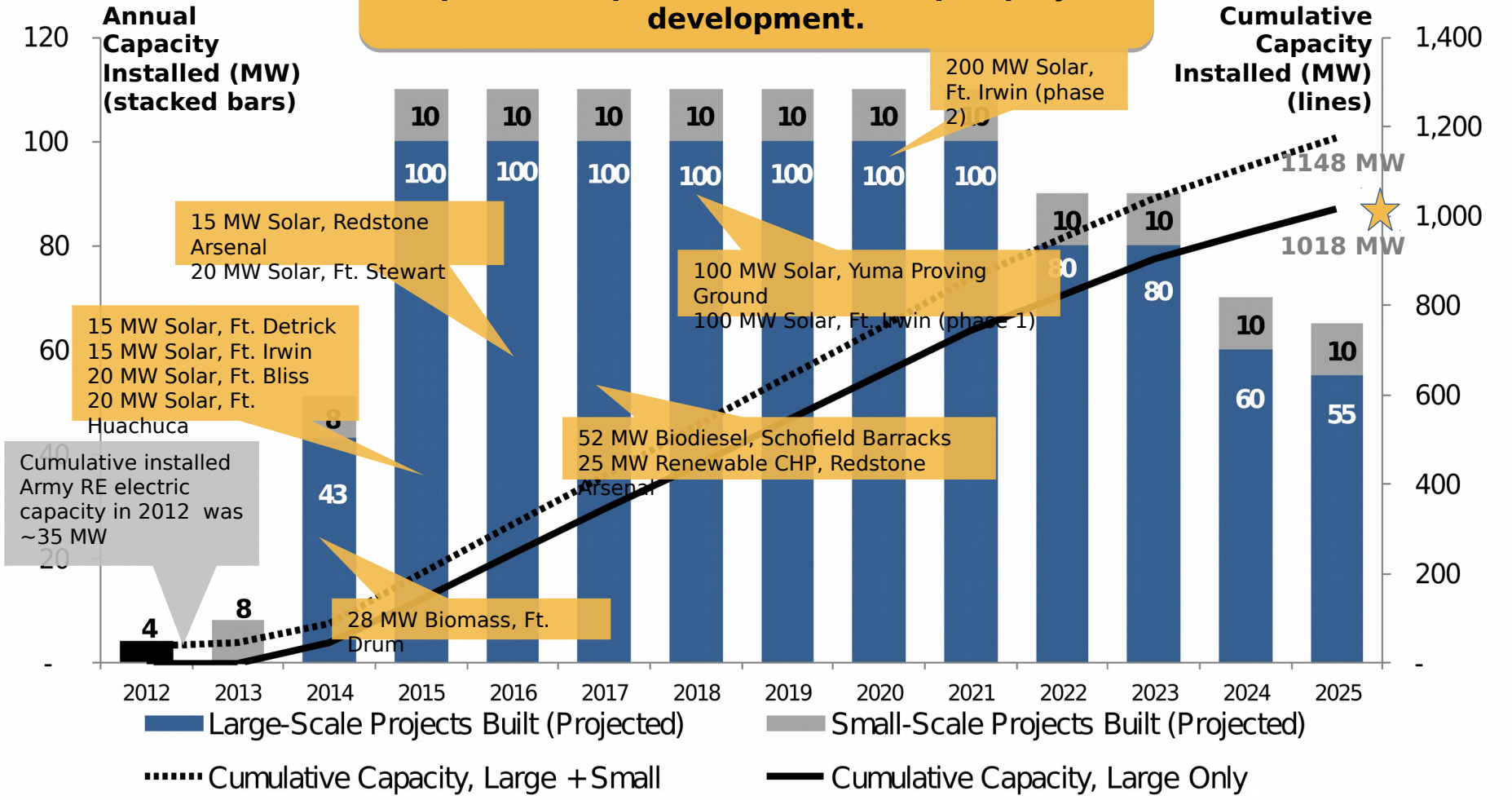
The EITF's projects will help ensure the Army's goal to deploy 1 GW of renewable energy projects by 2025

Current EITF Large-Scale Renewable Energy Opportunit



Pathway to 1 GW of Renewable Energy

Achieving Army renewable energy goals will require an unprecedented scale-up in project development.



Net Zero (NZ) Hierarchy

- **Net Zero INSTALLATION:** Applies an integrated approach to management of energy, water, and waste to capture and commercialize the resource value and/or enhance the ecological productivity of land, water, and air.

- **Net Zero ENERGY:** An installation that produces as much energy on-site as it uses annually.
- **Net Zero WATER:** Limits the consumption of freshwater resources & returns water back to the same watershed so as not to deplete the groundwater & surface water resources of that region in quantity or quality over the course of a year.
- **Net Zero WASTE:** An installation that reduces, reuses, and recovers waste streams.

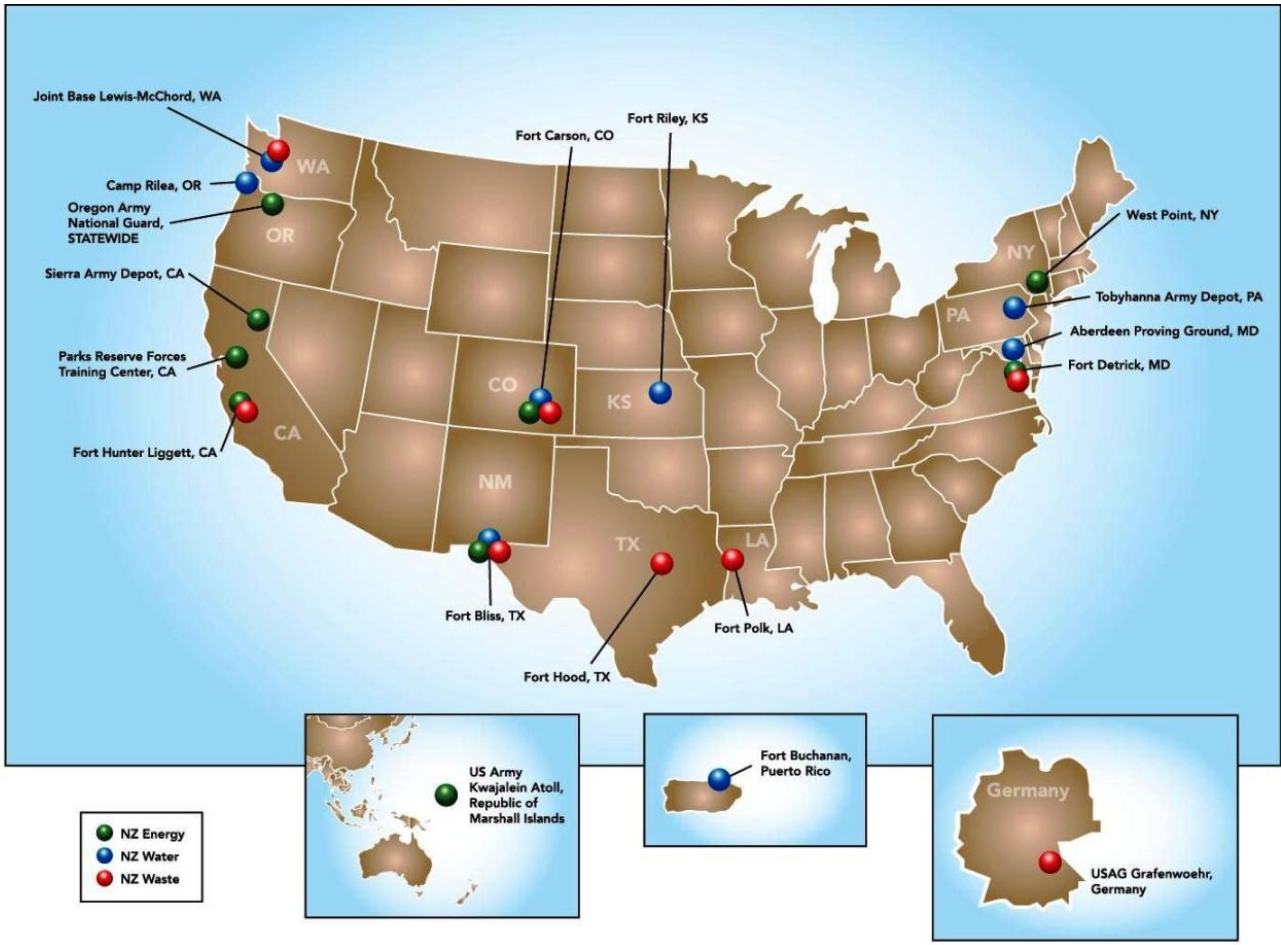
NZ Pilot Installations

Net Zero Pilot Installations:

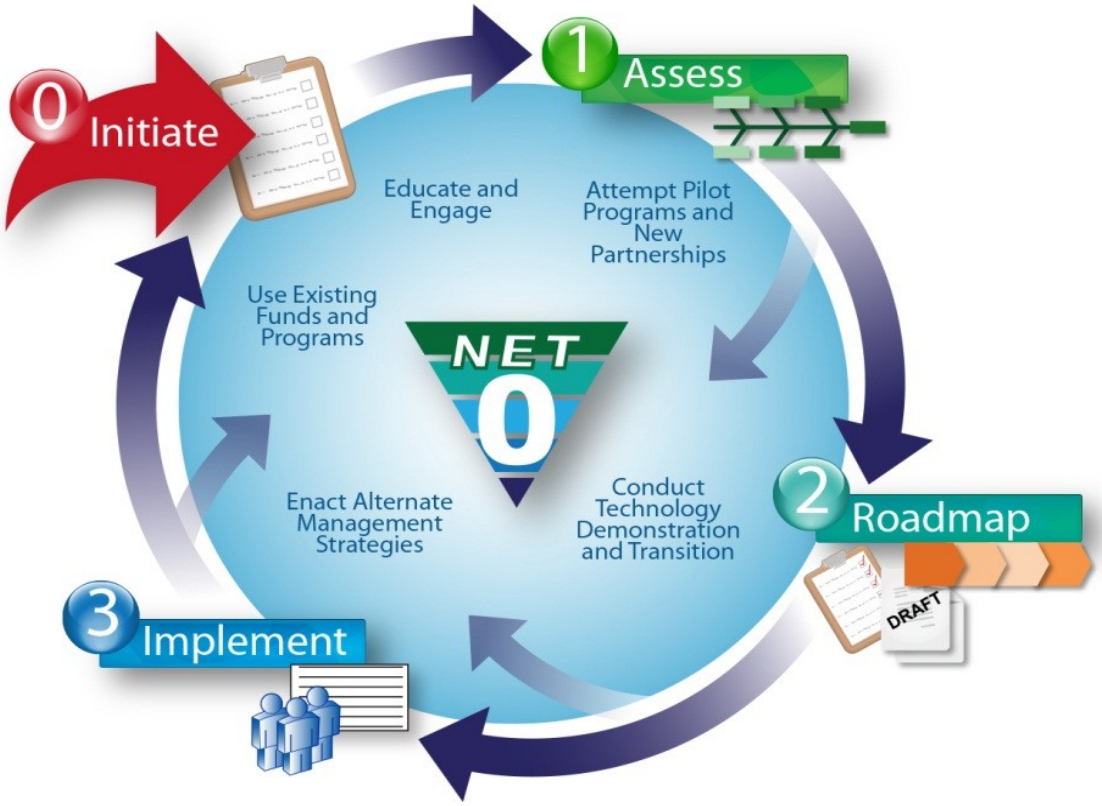
Aberdeen Proving Ground
Camp Rilea
Fort Bliss
Fort Buchanan
Fort Carson
Fort Detrick
Fort Hood
Fort Hunter Liggett
Fort Polk
Fort Riley
Grafenwoehr
Joint Base Lewis-McChord
Kwajalein Atoll
Parks Reserve Forces Training Center
Sierra Army Depot
Tobyhanna Army Depot
West Point

State-Wide Pilot:

Oregon Army National Guard



Net Zero Implementation



This circle graphic captures the overarching actions to be taken in implementing NZ at Army Installations: **Initiate, Assess, Roadmap and Implement**

Sustainable Facilities

Army sustainable design policy for new construction & major renovations (updated Oct 2010)

- ASHRAE 189.1 is baseline standard
- Greater energy efficiency (e.g., more efficient equipment, smart sensors, day-lighting)
- Renewable energy sources (e.g., solar panels, heat pumps)
- Improved water conservation (e.g., low-flow plumbing, zero-scaping)
- Reduced runoff (e.g., porous paving, cisterns)
- Green building materials (e.g., low VOC paints & carpets, recycled content materials

Fort Bragg LEED Platinum Community Emergency Services Station
Photo credit: USACE Savannah District

Fort Hood LEED Gold Spirit of Fort Hood Warrior & Family Chapel Campus

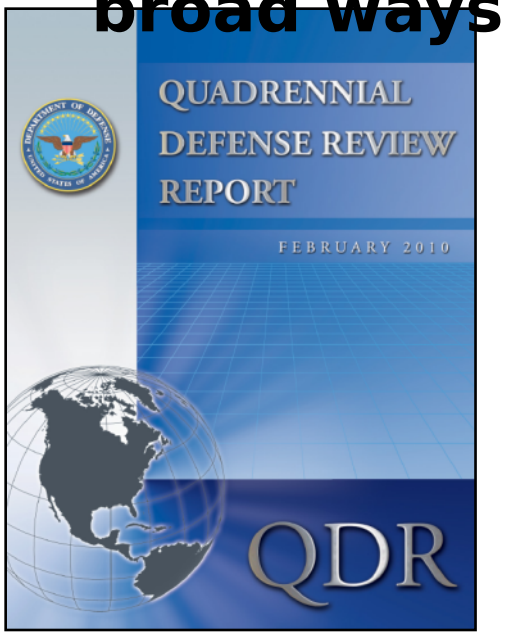
Sustainable Training

Army programs:

- Sustainable Range Program
- Integrated Training Area Management
- Installation Natural Resources Management Plans (INRMPs)
  - protects 213 threatened & endangered species on Army lands
- Army Compatible Use Buffers (ACUB)
  - over 158,000 acres at 28 installations protected to date

Climate Change

QDR: Climate change will affect DoD in two broad ways:



- **First, climate change will shape the operating environment, roles, and missions that we undertake:**
  - While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world.
  - In addition, extreme weather events may lead to increased demands for defense support to civil authorities for humanitarian assistance or disaster response both within the United States and overseas."
- **Second, DoD will need to adjust to the impacts of climate change on our facilities and military capabilities.**

Result: An Energy and Sustainability-Informed Army Culture

Implementing a Total Army Initiative: Fundamental change – people, processes, systems – managed at enterprise level.

- Army Leadership is taking both a top-down and bottom-up approach to become energy secure and sustainable.
  - Top Down: The Under Secretary of the Army is the Sr. Sustainability Official.
  - Bottom Up: The Net Zero pilot sites are identifying themselves for participation.

- There is increased awareness of how energy security and sustainability objectives cut across the entire Army Enterprise.
  - In FY12, the Army launched The Power Is In Your Hands campaign with the goal of making every soldier an energy manager.
  - Each installation's energy manager serves the Garrison Commander as the installation's energy champion in all phases of planning and executing viable energy programs.
  - Sustainability-informed decision-making is being incorporated into schoolhouse curricula.

The elevation of energy security and sustainability objectives into the ACP, a key strategy document, during a fiscally constrained environment reflects the increased importance of energy security